

Bernays (A. C.)

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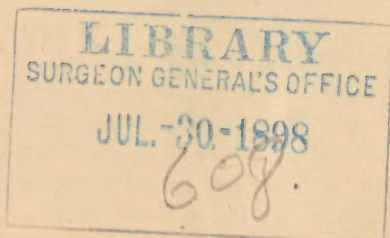
SURGERY OF PSEUDARTHROSIS.

ILLUSTRATED.

BY

DR. A. C. BERNAYS

OF ST. LOUIS, MO.





## CHIPS FROM A SURGEON'S WORK SHOP.

### CHIP No. XIII.

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#### Two Cases of False Joint Successfully Treated by the Bone-Plastic and Suture, with Experimental Notes.

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CASE I.—E. H. L., aged twenty-nine, sustained simple oblique fracture of the middle of the humerus, in consequence of a fall from a rapidly moving street car, on June 2, 1880. He was treated by his family physician, who put the fracture up in splints of strong pasteboard which were held in position by means of roller bandages. The forearm was carried in a sling. Patient states that his physician was very attentive, and removed the dressings almost every day "to see how the fracture was getting along" and to see that it was "in good shape." He also states that he had considerable pain each time it was bandaged, but that he always felt easy some hours after the doctor had gone. In fact, he says

there was very little swelling at any time and no pain except at the time of the dressing, and two or three hours afterwards. His general health and appetite were good all the time, and he seems to have had no fever.

After the lapse of eight weeks, his doctor, finding that the arm was still quite useless and that although there was considerable callus thrown out around the broken ends of the humerus, informed the patient of the fact that union had not taken place, and that he had what was called false joint or pseudarthrosis. The patient and his doctor then called on a prominent surgeon, and after consultation it was determined to try the effects of a severe friction of the fractured ends. This was done in the latter half of the month of August, about eleven weeks after the accident had happened. The rubbing together of the ends was done while the patient was etherized, and the arm was put up in a wooden splint over which a plaster of Paris bandage was rolled. Patient says that he had some pain for a few days, but after that felt comfortable. After



six weeks, this splint was removed by the surgeon, and it was found that union had not taken place; the arm was just as useless as ever. The surgeon then proposed to try friction again, and, at the same time, to drive some ivory pegs between and into the fractured ends. This was done in October, about eighteen weeks after the original injury. The same splint as before was put on and the arm

again put up in plaster of Paris. The pegs were left in the arm for one month; patient says they caused a little supuration. One of them came out easily, the other required considerable force to be extracted. Patient showed the pegs to me, and one

of them is quite rough, and I think it must have caused the formation of bone tissue, in its immediate vicinity. After the pegs had been withdrawn, the little peg holes healed up rapidly. The bandage was allowed to remain a month longer. Twenty-six weeks after the injury, it was found that the arm was powerless and that the patient was in as bad a condition as ever. The surgeon then proposed wiring the ends of the bone together after having freshened them with saw and chisel. He said that this procedure was more dangerous and also that it might not be successful.

The patient being very much discouraged went from one surgeon to another getting opinions, and also submitted to all sorts of quackery and treatment by cure-alls in the form of salves and liniments. He kept his arm splinted and was able to use his hand and fingers while his humerus was supported by the splints.

In this condition, about fifteen months after his fall, he came to con-

sult me, and I succeeded in gaining his confidence to such a degree that he permitted me to perform the operation which had been proposed to him by the first surgeon.

I found the arm shortened one inch and a half, the fractured ends overlapping one another in the manner shown below (fig. 1). The ends were grown together by fibrous bands, and it was not possible to bend them so as

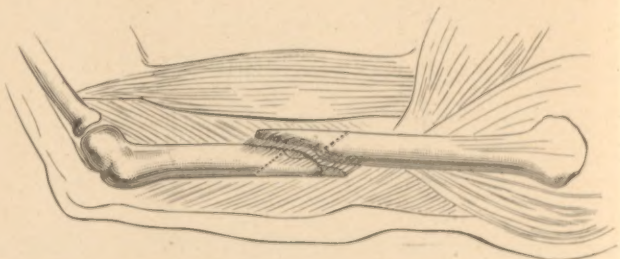


Fig. 1. The fractured ends are held together by fibrous bands.—The dotted line indicates the direction of the saw-cuts.

to form a right angle with each other, although they permitted a limited excursion, the lower end being movable in all directions around the upper. The farthest excursion was possible in a lateral direction, in which the lower end of the humerus could be made to describe a segment of a circle about  $90^{\circ}$  to  $100^{\circ}$ , the false joint being the center.

The patient was chloroformed, and I made a straight incision through one of the scars left by the ivory peg down the outer side of the arm. The incision was about four and a half inches in length; it began at the insertion of the deltoid muscle and extended downwards to within three inches of the epicondylus externus. The incision was carried down to the bone between the muscles along the intermuscular septum. The lower fragment was first entirely freed by denuding it of all periosteum for a distance of one and a half inches. I then sawed off a wedge-shaped segment (similar to fig. 5) by means of two



saw-cuts which were made at exactly a right angle to one another, in a direction which was again at right angles to the oblique line of fracture. (See dotted line in fig. 1.) This left a rectangular gutter obliquely across the lower end of the humerus. Next the upper end of the humerus was liberated by denuding it of its thickened periosteum with a Langenbeck's elevator. Two pieces were now sawed off from this end, the saw-cuts being at right angles to one another in such a manner as to leave an oblique wedge-shaped end which would exactly fit into the groove on the lower fragment. I now drilled two holes into opposite points of the ends, and passed a silver

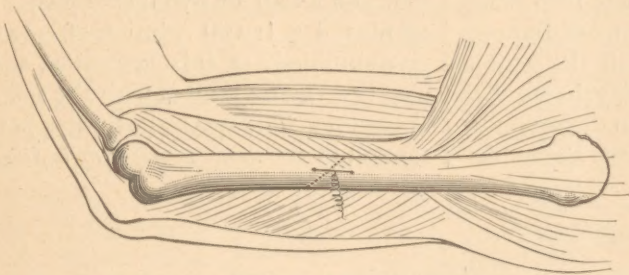


Fig. 2. The bones adapted after they had been sawed so as to fit. The wire suture is shown with the ends twisted.

wire through them, which was fastened by twisting, the ends being left long enough to pass out of the wound. After the Esmarch bandage was removed and all hemorrhage had ceased, the wound being irrigated with a solution of carbolic acid, I introduced a drainage tube and united the wound by means of twelve very deep and numerous superficial silk sutures. The whole was put up into a carefully made, tight fitting sleeve of plaster of Paris, which was applied over a thick layer of carbolized gauze. The sleeve extended from the shoulder to the wrist, inclusive. The operation lasted one hour and ten minutes; the patient suffered no shock. His pulse was 80, temperature 99° F.; no pain at 8 P. M., the day of the operation.

I allowed the plaster sleeve to remain unopened for six days, there being no fever nor pain, and no swelling of the fingers. On the seventh day, I opened the bandage, by cutting out an oval fenestra, because a spot was visible on the outside of the plaster of Paris, which was due to some secretion of the wound. I found the wound healed by first intention, and only secreting through the drainage tube. The stitches were all removed, and the wound dressed daily with absorbent cotton. The drainage tube was permanently removed on the twelfth day, and the silver suture was taken out with considerable trouble after four weeks. It was surrounded

by callus. All secretions stopped at the end of the fifth week. I allowed the plaster sleeve to remain on eight weeks in all. After its removal, I was much elated to find that firm union had taken place. The patient to-day, six and

one-half years after the accident, has a useful arm, which is but little, if any, weaker than his left arm, although it is fully an inch and a quarter shorter.

CASE II.—Fred. V., twenty-four years of age, from Stanton, Ill., coal miner, received a simple fracture of the femur, an inch and a half above the middle, by a fall. He was treated by the local physicians, with plaster of Paris dressings, and there was a failure of union. A surgeon from Litchfield, Ill., then sawed off the ends of the bones and again applied plaster of Paris dressings. The result was negative; union again failed to take place. From the patient's description, the plaster of Paris bandage only extended from just above the



knee to about the region of the trochanters. It is evident that a dressing of this kind was entirely insufficient, and a union could not have been expected.

dle of the quadriceps. Not wishing to make a new lesion, I was compelled to cut through in the same place. This was also partially the cause of the great difficulties I encountered in

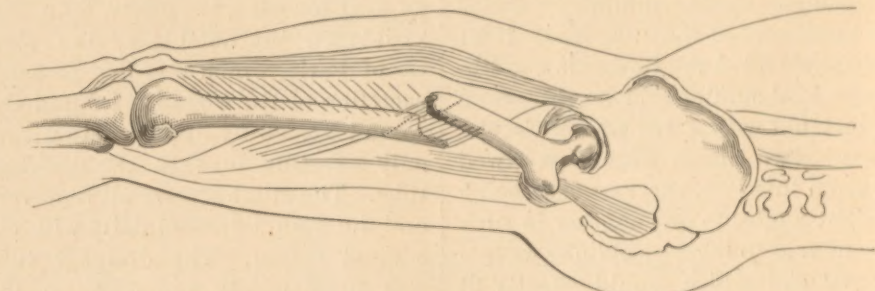


Fig. 3. The false joint, held together by bands of tough connective tissue.

Ten months after the accident, the patient came to me, and the first Sunday morning in October, 1886, with the assistance of Dr. Ohmann-Dumesnil and Dr. Glancies and the senior class of the College of Physicians and Surgeons, I performed an operation in every way like the one above de-

freeing the lower fragment, which had to be done at the bottom of a wound, four and a half or five inches deep. I employed a 1:1000 solution of corrosive sublimate in this operation, and also used gauze treated with the same antiseptic. The bone plastic was performed in the same manner as in Case

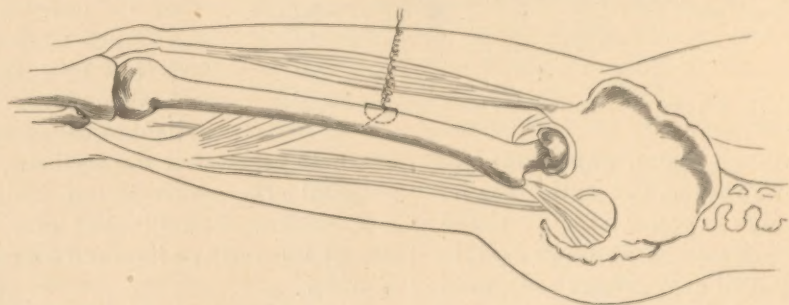


Fig. 4. The false joint has been resected. The ends are seen adapted. The wire suture is shown in position.

scribed. An exact conception of the condition of the fracture before and after the operation will be gained by a short study of the accompanying engravings (figs. 4 and 5). The operation was much more difficult than the first one, on account of the much larger and deeper wound, which was necessary to liberate the fragments, they being bound together by tough scars, the result of a former operation. The first operator had made his incision straight through the mid-

I. I used iron wire, instead of silver (fig. 4). Fig. 5 gives an exact drawing of the size and shape of the pieces of bone which were removed in this case. Fig. 6 is a diagrammatic representation of the method which was employed in both cases to secure an accurate adaptation of the ends. The healing process was not as simple as in Case I. Free suppuration began on the tenth day, and continued for six weeks. I was compelled to cut a counter-opening through the posterior



surface of the thigh, between the biceps and semi-membranosus muscles. In spite of this suppuration, consolidation and perfect union took place. The patient left the hospital fourteen weeks after the operation.



Fig. 5. The resected portions of the femur in the second case.—Natural size.  
These drawings were made by Dr. Ohmann-Dumesnil.

I attribute the good result in both cases to the fact that, after the ends had been freshened, *perfect rest* was given to the injured parts by means of the plaster of Paris encasement, which was applied in so extensive a manner as to include the entire joints above and below the fractured bone. A further advantage of my method of operating, for which I may claim originality, is found in the bone plastic which I employ. *The figures will show that after the trimming of the ends of the bones and placing them into their new positions, the ends are just reversed.* The end which was anterior before the operation, is given the posterior position afterwards, and *vice versa*. The contractions of the muscles will, therefore, only aid in keeping the fragments together, instead of pulling them apart, as was the case before the plastic operation. The manner of fitting the ends together not only tends to prevent longitudinal dislocation, but also makes any lateral displacement al-

most impossible. From my experience in Case II., I am led to conclude that the wire suture is not essential, since in that case the wire broke or rusted through about the seventh day, and could not have done much good.

During many of my bone operations, I have noticed that some of the bone-dust which is produced by the saw must fall into the wound, and it is highly improbable that every particle of it can be afterwards washed out of the wound. It is a fact, proven by experimental histology and pathology, that particles of periosteum left in the peritoneal cavity, or introduced into the subcutaneous or intermuscular tissue of animals, will become organized and will produce bone tissue.

I performed some interesting exper-

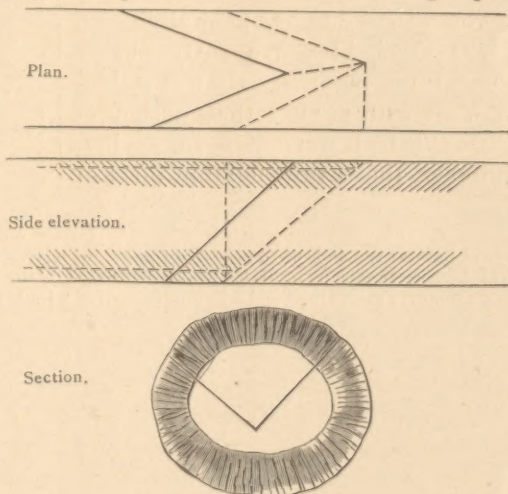


Fig. 6. Diagrams showing the method employed in the Osteo-plasty.

iments, during the last summer, on two young dogs, for the purpose of testing the possibility of growing bone on a connective tissue soil. \*I prepared some bone-sawdust of various degrees of fineness, and made it aseptic with three per cent carbolic

acid. I then kept it in diluted and sterilized carbolized glycerine for a few days. I made wounds in several places on the extremities, the abdomen and back of the two dogs, and introduced large and small quantities of my aseptic bone-seed into them, by spreading the carbolized bone-dust into the wounds. These were carefully sutured. The wounds all healed by the first intention, except one, and it was in a badly chosen place, near the pup's groin, so that it was irritated by walking. I killed the first dog on the twenty-first day, and I found that my seed had taken in many places. I found the small particles of bone surrounded by nests of young bone-cells, arranged around a capillary vessel in an irregular ring. Some of the larger pieces of bone seemed to be encysted by young connective-tissue cells, in which I found no bone-cells.

The second dog was kept alive, and I examined him frequently during about three months. He was stolen, or went astray, after that period of time. I feel warranted in saying, however, that a thin, flexible plate of

bone as large as a silver quarter-dollar had formed under the largest one of the wounds which I had inflicted upon him, near the umbilicus.

If these experiments can be corroborated by other experiments on man, the production of bone may become of great practical utility. For instance, a thin layer of bone might be thus grown under a skin-flap which we cut from the forehead for the purpose of rhinoplasty. This would prevent the sinking in of our artificial noses, a disadvantage which has always been the drawback to our success in this direction. In operations where it is desired to unite bone, such, for instance, as are related above, this artificial growing of bone in any place where there is connective tissue, might also greatly aid our endeavors, and contribute, in no small degree, to a successful termination.

903 Olive St., St. Louis, Mo.  
Jan. 20, 1887.

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\*All the experiments I ever made to engraft large pieces of bone, in animals, failed. The pieces simply became surrounded by periosteal bone tissue and, after this was accomplished, they remained foreign bodies and had to be extracted.

NOTE.—The operation which had been performed on the second case, must have been of a very subtle nature; the ends of the bone, as I found them, would not warrant any one in saying that they had ever been freshened by a saw as positively stated by the patient. After my operation the shortening only amounted to one inch and a half as compared with the normal leg.